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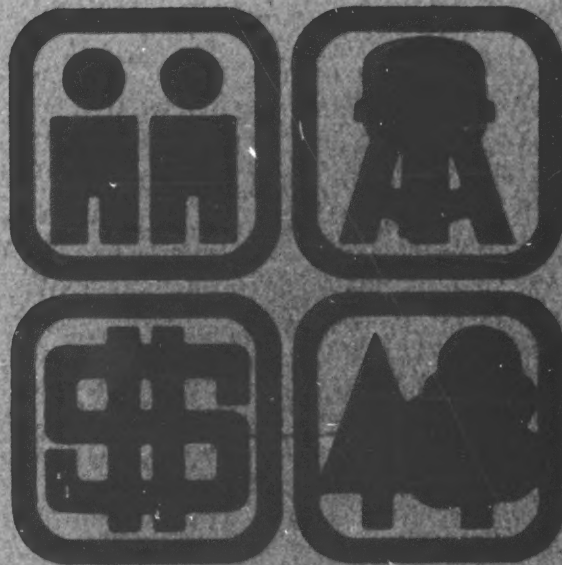
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ABSTRACT

Research literature bearing on factors related to industrialization in rural areas is reviewed in order to identify information that might be useful in improving cost-effectiveness of public programs at local, state, and national levels as well as of private action taken by voluntary organizations in an effort to increase manufacturing employment opportunities in sub-metropolitan areas. The review discusses desirability of rural industrial location as opposed to migration and the potential rural areas have for attracting industry, along with situational factors which affect potential (agglomerative influences, transportation economies, labor supply). Research reviewed on effects of governmental policies on rural industrial location covers primarily highway and transportation policy, taxation (both tax concessions and general taxation levels), financing (state and federal loan programs, local government bonds, both general obligation and industrial revenue bonds), collective bargaining and labor relations, and education and other public services. Literature cited for community actions that support industrial development deals with promotional organizations, site-related activities, and local action to improve public services (including education). Finally, research on factors affecting growth of rural area plant employment are covered. (RS)

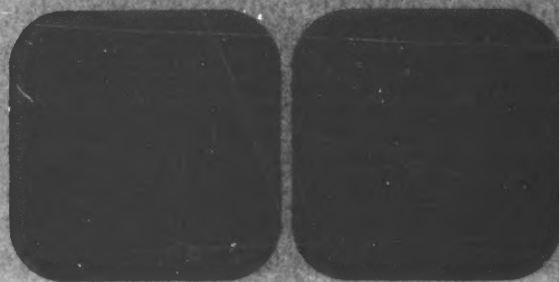
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SYNTHESIS

Industrialization of
Rural Areas



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FOREWORD

Under the sponsorship of the Southern Rural Development Center, ten teams of researchers and educators throughout the southern region have devoted the past year to a synthesis of timely and practical research in selected areas of interest.

These ten Functional Networks, each under the leadership of a Center Associate, have prepared larger annotated bibliographies of important citations uncovered in their investigations. These synthesis papers follow the bibliographies, and are intended to relate the useful applications to be derived from their survey of the literature.

More than just summary documents or reports, these synthesis papers can serve as a starting point for rural development planning and projects from the national to the local level. They assess the current state of knowledge and pinpoint techniques and methods for application of these findings.

This paper was prepared by the Network on Industrialization, under the leadership of Dr. Eldon D. Smith at the University of Kentucky. The Network's bibliography and additional copies of this paper are available from the Southern Rural Development Center.

William W. Linder
Director
Southern Rural Development
Center

A Synthesis

INDUSTRIALIZATION OF RURAL AREAS

Location and Growth of Manufacturing Firms
in Sub-Metropolitan Areas

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This synthesis is the product of an SRDC Functional Network with chairmanship at the University of Kentucky. A contractual agreement between the SRDC, the University of Kentucky, and the Co-operative State Research Service of the U.S. Department of Agriculture provided for this participation and cooperation.

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INDUSTRIALIZATION OF RURAL AREAS

Location and Growth of Manufacturing Firms in Sub-Metropolitan Areas

Eldon D. Smith*

Introduction

Are smaller communities swimming against a tide of further centralization of industry in a few major metropolitan areas, or can rural communities increase employment opportunities by inducing manufacturing industry to locate there? What types of communities have the best chance to establish a base of manufacturing industry employment? Can governmental policy at state and national levels be influential in improving their likelihood of success? What kinds of policies would be most effective? Can local communities themselves develop effective programs to attract industry? What actions, direct or indirect, will be effective? In what types of communities? At what cost?

These are some of the questions that are being posed by local, state, and national government officials, by lay citizens to whom they are accountable, and by voluntary organizations. The purpose of this monograph is to review the available research literature bearing on some of these questions. This will be done with a view to identifying information potentially useful in improving the cost-effectiveness of public programs at local, state, and national levels as well as private action by voluntary organizations in their quest for manufacturing employment opportunities.

Why Local Industry Rather Than Migration?

Several million rural residents have already "voted with their feet" and migrated permanently to major industrial centers during the past three decades. For those who migrate we must assume either that they are irrational and uninformed or that their level of economic and social well-being as they view it is higher in an urban environment. That productivity gains have been registered in the national economy as a result

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of this extensive transfer of labor and associated deepening of capital in farming and other rural economic activities is also largely beyond doubt. Only evidence of very substantial externalized costs would negate this conclusion.

The research of Hanrahan (1972) and Morgan (1973) casts very serious doubt on the hypothesis that public sector costs associated with migration to urban areas greatly exceed added tax contributions. In contrast, the existence of large private sector externalities, such as the costs associated with traffic congestion, noise and pollution abatement, and other factors resulting from urban agglomeration, are more a matter of conjecture. Research has scarcely scratched the surface with regard to these private sector externalities. Nonetheless, such costs would have to be exceedingly large to compensate for the apparent differences in productivity of manpower in major urban centers and similar manpower in rural areas (Morgan, 1973; Deaton, 1972; Hanrahan, 1972; Smith, 1954).

These generalizations obscure possible differences in experienced benefits and costs among individuals and communities, to say nothing of the possible intangible "costs" in terms of such factors as long-run cumulative erosion of family cohesion, social ethics, and group identification. The significance of such intangible costs for human welfare cannot be evaluated objectively with existing tools of analysis. However, even if this were possible, it would tell only a part of the story. Of no less importance are the economic consequences of outmigration for residual rural populations, which are, at least in principle, analyzable with conventional tools of economics.

Selectivity of Migration and Public Sector Economics

The migration process is highly selective; the younger working age categories (ages 16 to 40), the more highly educated (or occupationally skilled with regard to urban-oriented tasks), and the more physically able much more frequently migrate to urban areas. The logical consequence is that rural populations tend to have higher ratios of dependents to nondependents, and ratios of nonemployed (inclusive of those physically and mentally able to work but not seeking employment) to employed persons. The ratio of high wage and salary categories of employees to the total work force is also notoriously lower in rural areas.

The net result must be interpreted in the context of a governmental structure that requires local units of government to bear a major share of the costs of local public services and support of indigents. It results in the placement of a much heavier financial burden on the remaining productively employed population than is typical of urban areas.¹ While a variety of grants and formula allocations from higher levels of government in some degree offset these disadvantages, to a very

large extent the financing of local services is dependent on local revenues. Thus, the burden falls heaviest on the communities least able to pay.

Diseconomies of Scale and Excess Capacity in Local Services

While major centers of population have their own unique set of problems, including the recent flight to the suburbs, the most severe problems suffered by communities experiencing rapid growth have been those of providing capital with which to finance construction of new public facilities and expansion of services. School expansion has been a particularly acute problem in some areas because the influx of rural manpower has been primarily from the childbearing and childrearing age groups. Private service sectors have, in contrast, "suffered" from an embarrassment of riches--a rapidly expanding demand for the whole range of retail and related services.

The reverse is true in those regions that have been rapidly depopulated through outmigration. Problem areas readily appearing are school consolidation, designed to provide more comprehensive educational services and to accommodate diminished enrollments; school transportation; a diminished tax base; even greater diseconomies of small scale in the provision of some public services; reduced demand for local private sector services; and greater spatial diseconomies in provision of roads. In summarizing the rather unsatisfactory evidence on economies of scale in provision of public services, Hansen (1971) and Hirsch (1969) conclude that these economies are not exhausted until well beyond the 50,000 and possibly beyond the 250,000 population level. More recently Shapiro et al. (1977, p. 56) have estimated that total costs of community services decline from \$563 per capita for a community of 10,000 population to a minimum of \$186 for a community of 57,000.

Smith et al. (1973, p. 14) have estimated that total 1966 annual costs per mile were \$345 for minimum width (16 foot), traffic-bound, rock surfaced roads² in Appalachian Kentucky. This is equal to more than \$1,000 in 1977 dollars and is primarily a fixed cost independent of rate of use over significant ranges. In addition, by law, rural school bus service must be provided irrespective of population density in most states; thus, as population declines, costs per household and per child increase. Electric power and telephone services are similarly affected.

These are but a few examples. While outmigration creates opportunities for private sector efficiencies and increases in returns to labor of relevant age groups, it is obvious that: (1) there are important externalized costs which are shifted from migrants to residual populations, and (2) per capita or per family costs increase as population declines in rural areas. These factors, plus the potential effects of new industrial investments and the impact of reduced or reversed net migration

on the tax base, provide the basis for interest in rural industrial growth.³ Consequently, this study is designed as a review of research on rural industrial location.

Rural Industrial Location

The evaluation of the feasibility of national, state, or local governmental action designed to encourage investment in new manufacturing industry must take into account the competitive position of rural areas vis à vis existing urban industrial centers. For the rural South, the issue also involves that region vis à vis the older industrial areas of the northeast and upper midwest as well as the newer growth area of the Pacific coast.

General Potential of Rural Areas

As yet, economists have been unable to rigorously identify and quantify the causal agents that have brought about changes in aggregate movements of industrial activity between rural and urban areas and among major regions; they have only been able to note their occurrence, and extrapolate them into the future. Economic analysis thus far has been largely confined to studying the significance of these trends for affected areas and suggesting needed public action. For example, Wallace and Ruttan (1961) noted that evidence showed a continuing trend toward concentration of industrial activity in existing urban centers; therefore, they reasoned, rural communities without special amenities or locational advantages would find locational inducements to be "clearly crucial" if they desired additional industry.

Hansen (1971), in developing his proposed growth center strategy, focuses his argument on hypothesized large agglomerative externalities that, in his view, make expansion in existing metropolitan areas relatively attractive. Hansen (1974, p. 28) further contends that, "first, the growing metropolitan areas benefit from external economies of agglomeration as well as from cultural and geographic amenities, and these factors provide the impetus for self-sustained future growth." He cites a variety of factors contributing to the disadvantage of rural areas, including inadequate connections with long-distance transportation, low levels of public services, a poorly trained labor supply, mistrust and antagonism on the part of established local leaders who fear disruption of the status quo, and lack of access to more adequate financial institutions. In addition he (p. 28) quotes Wilbur Thompson (1968) in part as follows: "The economic base of the larger metropolitan area is, then, the creativity of its universities and research parks, the sophistication of its engineering firms and financial institutions, the flexibility of its transportation networks, and utility systems. . . A diversified set of current exports. . . a rich infrastructure. . .

providing the socio-economic institutions and physical facilities needed to initiate new enterprises, transfer capital from old to new forms, and retrain labor."

As guiding hypotheses, these types of statements have value. They identify factors that may possibly affect the relative economic advantage of rural areas vis à vis large urban areas. However, the quantitative significance of these factors with respect to this advantage has not been determined; hence, we have no concrete basis for predicting whether these trends will be accelerated, moderated, or even reversed. Thus the acceptance or rejection of Hansen's general thesis that, in the aggregate, central cities retain the centripetal forces that will make rural industrialization efforts extremely costly as a tool of rural development is a matter of judgment or conjecture.

To summarize, the issue is not whether these factors are of decisive importance to some or even to substantial numbers of industries. Rather the question relates to how many industries (with how many employees) will find these factors to be of greater importance to their profitability than the open spaces, substantial pools of unskilled and largely nonunionized labor, and other advantages of rural areas. Further, in assessing this issue, we are largely forced to rely on extrapolation of trends from recent periods, judgmentally introducing such other elements as changes in international markets and the effects of relatively high rates of unemployment concurrent with inflation.

Evidence partially testing Hansen's conclusions is provided by Garrison (1974) and Haren (1970, 1974) who have analyzed recent trends in manufacturing employment. In contrast to Hansen, they suggest that, during the 1960s, the balance of advantage had clearly shifted in the direction of the rural areas, especially those in the South. Rates of increase in manufacturing employment, despite relatively slow growth nationally, were relatively rapid, especially in rural and small town counties; Haren (1970, p. 431) comments that new plant locations or expansions accounted for "about half the gains in manufacturing employment in smaller or non-metropolitan labor market areas, or about 20 percent of the national total . . . in entirely and partly rural communities." Garrison (1974, p. 51) notes that, "in terms of employment shares, the rural and small town counties [in the Tennessee Valley], which together accounted for only 23.7 percent of the region's manufacturing employment in 1959, accounted for 39.1 percent of the increase during the period [1959-1968]."

Whatever its explanation, the trend toward relatively rapid rates of industrial growth in rural areas seemed to be well established as of 1972, when Haren (1974, p. 19) wrote: "Contrasted with a fairly pronounced downturn in manufacturing employment in metro areas in the past 2 or 3 years, manufacturing job levels in rural and other non-metro communities remained remarkably stable and may well have expanded."

While these trends are impressive, there was a heavy concentration in low technology; "labor intensive industries of the two most rural groups [of counties in the Tennessee Valley region which] accounted for 56.8 percent of the employment increase" (Garrison, 1974, p. 51).

Haren (1974, p. 22) notes that "concern over the low wages paid and the 'foot loose' nature of many undertakings was reduced by the realization that a large number of jobs were being occupied by women, for many of whom previous employment opportunities were limited." However, dependence on these low-growth industries that are vulnerable to foreign competition may suggest caution with regard to extrapolation of trends occurring during the 1960s.

Further evidence from the U.S. Dept. of Commerce Survey of Industrial Location Determinants (1973a) and Survey of Manufacturing Plant Characteristics (1973b) presents somewhat ambiguous results. In the latter, 50 percent of the 3,633 plants reporting were then located in non-metro areas. However, 27 percent of the 2,633 plants reporting on the location determinants survey had tentative plans to establish or to expand plants at new locations in the 1971-1975 period. Of these, only 38 percent indicated a specific preference for sub-metro size communities. However, when asked to make a discrete choice of preferred location for locating a new or expanded plant, only 6 percent indicated a preference for locating in a central city of a metro area compared with 45 percent stating a preference for suburban metro and 46 percent for non-metro areas.⁴

It is apparent that the trend information provides a somewhat more optimistic and consistent picture than the opinion or preference information regarding continuing movement toward rural areas. Nevertheless, Hansen's (1971) generalizations must be questioned for the particular 1960s period to which he referred. In general it appears that the centripetal forces at work had been less powerful than the centrifugal forces.

Regional differences also have been noted. Unlike the Great Lakes, the lower Southeast and Midsouth industrial belts, "In the Carolina Coastal Plain and the Tennessee Valley-Southern Appalachia segments of the Upper Southeast, . . . the process appears to be more one of widespread diffusion rather than spillover of industry into nearby satellite or fringe communities" (Haren, 1974, p. 14). Quantitatively, however, the rural South generally has been the area of most rapid growth. Again, the differences in patterns or trends are not explained by any systematic research.

While the evidence is not altogether satisfactory, it seems reasonable to conclude that rural areas outside the northeast, the Great Plains and the West have a good chance of capturing a disproportionate share

of any manufacturing industry growth that occurs in the near future, especially if additional inducements are proffered to industrial clients. And it is not impossible that they may benefit from some shifts of existing employment to new locations.

Situational Factors Affecting Rural Area Potentials

There are, of course, some factors that have been at least partially researched which have a bearing on rural area potential, both in general and with regard to particular groups of communities. These include:

- (1) agglomerative external economies; (2) transportation economies; and
- (3) location relative to lower cost, appropriate quality labor supplies.

Agglomerative influences.--The concept of agglomerative external economies is potentially very broad, even broader than the statements by Hansen (1974) and Thompson (1968) which were noted earlier, would imply. The size of the community is obviously closely correlated with the size of its economic base. Community size (population) is, in turn, closely correlated with the scope of urban recreational amenities, medical and dental services, educational opportunities, and the variety of privately produced goods and services available for both business and household consumption.

It is obvious that these external economies vary in importance among industries. This is illustrated by data from an Economic Development Administration (EDA) survey report (1973a), which shows that only 4 of 26 plastic packaging and shipping container manufacturing firms (SIC 30794) preferred sub-metropolitan size locations compared with 17 of 33 firms manufacturing business forms (SIC 27611 and 27612). Yet we find no available techniques by which these agglomerative economies can be rigorously measured even for small classes of industry. Moreover, for most purposes of public policy and local action, the relevant questions have to do with the entire aggregate of manufacturing industry rather than with small specialized segments.

When the issue is posed in this way, a large number of studies surveying the reasons for having chosen particular locations generally appear to provide very little insight. For example, in Mueller and Morgan's (1962) survey of reasons (ex ante) for considering new plant locations, relocations, and expansions of existing operations of Michigan firms has similar limitations. In the Morgan-Mueller study labor costs and unionism ranked as the most frequent class of reasons for relocation as well as for new plant locations; however, proximity to markets and sources of supplies also ranked high. This suggests that the problem is one of tradeoffs between the net advantage of the urban areas with their markets, skilled labor supplies, and other advantages relative to rural areas with cheaper, usually more abundant, but mainly unskilled labor.

Two studies provide the primary sources of insight with respect to agglomeration, a large sample survey of industrial location determinants by the Economic Development Administration (1973a) and a doctoral dissertation study of Tennessee and Kentucky rural industrial locations by David R. Kelch (1977).

In the EDA survey, the size of the community was regarded as of "critical" or "significant" value by 31 percent of the 2,616 firms responding, and only 38 percent indicated that a sub-metropolitan size city would be preferred. Yet when allowed to indicate whether more than one of the three categories (central city, suburban metro or non-metro areas) would be "preferred," a slight preference in favor of non-metropolitan areas over suburban areas was indicated (49 compared with 45 percent).

In a study of new plant locations in Kentucky and Tennessee during 1970-1973, Kelch (1977) utilized regression (linear probability function) analysis. The 1970 manufacturing employment in the county, a proxy for agglomerative influences, was statistically significant in only one of five regions (Appalachian Kentucky) in explaining whether or not plants with 20 or more employees located in its 70 communities. This suggests that, in the aggregate, and within sub-metropolitan community size ranges, agglomerative economies were not quantitatively very important, other factors remaining equal.

The Appalachian Kentucky exception to this generalization is not explained by the evidence presented. Several agency officials and industry management personnel have suggested a possible explanation. It is that this particular area, which includes a major coal mining region, is regarded as a hostile political and labor organization climate. Thus, it may be that those few nodes of conspicuously successful manufacturing activity are considered the only reasonably safe loci for investment.

The presence of colleges and universities was noted by Thompson (1968) as an agglomerative influence. Yet how important are they? Only 8 percent of the Kentucky and Tennessee rural communities had two- or four-year colleges. With population size and other factors taken into account, this factor was only marginally significant ($P=0.10$) in explaining new locations (Kelch, 1977). And the EDA survey (1973a) reports that only 15 percent of firms considered higher educational facilities to be of critical or significant value in locational decisions.

Transportation Economies.--Most modern industries manufacturing finished consumer goods serve fairly broad regional or national markets. This is also generally true if the plant provides components and materials for other manufacturers. Hence, while transportation costs of materials or product output may figure importantly in the choice of region, it seems unlikely that it would greatly affect the choice of an urban versus a rural location. However, McMillan (1965) distinguishes between factors affecting the choice of region and those affecting the

choice of a particular site or community. This suggests that access to good transportation routes (or its substitute, location in proximity to a major urban area) may be the means whereby access to urban goods and services can be provided at modest cost while enjoying the cost advantages of a rural location.

In the EDA survey (1973a), 76 percent of the respondent firms felt that location within 30 minutes of a major highway was of critical or significant value, while 40 percent indicated that this was true of scheduled rail service. Kelch (1977) found that location in a county with immediate access to an interstate highway or four-lane toll road was statistically significant in explaining new plant locations in the 1970-1973 period. However, such facilities improved the probability of a new plant location during the period by only an estimated 6.8 percent and seemed to have no significant effect in some of the regions. It would appear that most communities have access to other satisfactory improved roads, or roads feeding into the interstate system. Thus the major advantage of the road system may be that of making the general area more accessible rather than of determining locations within the region.

Garrison (1967, pp. 193-194), among others, indicates that in areas near urban service centers the more sophisticated urban services tend to be substituted for local services. With the improvement of transportation networks we might expect this to be a more widespread phenomenon, counteracting some of the centripetal force of urban agglomeration. In the aggregate, the Kelch study (1977) tended to confirm this view. Regression coefficients for distance from nearest SMSA were nonsignificant or were opposite from the expected sign in all but one regional model (Appalachian Kentucky). Further, in that model, a location 100 miles distant from an SMSA reduced location probabilities only by an estimated 10 percent for the four-year period.

Kuehn and West (1971, p. 24), using rank correlation methods, conclude that "highways were associated more with total regional development than [with] the average welfare status of Ozark counties. Even with total income, highways were only moderately correlated." They found little or no correlation between class of highway and unemployment or proportion of civilian labor force employed outside the county of residence.

Labor Supplies and Industrial Potentials.--The opinions of industrialists are relatively uniform in citing labor supplies as a major determinant of location in rural areas, especially in regions of low incomes such as the rural South. The EDA survey (1973a) suggests that a pool of skilled labor and a pool of unskilled labor are about equally important in the selection of a location. Labor costs were ranked highest as determinants of prospective new locations, expansions, and relocations of Michigan manufacturing plants (Mueller and Morgan, 1962). Surveys by Turner and McGee (1972), Escott (1964), McGraw-Hill Research (1964), and many others also support this general view. However,

statistical verification of this view is extremely difficult, because of the inadequate measures of labor supply, labor quality, and, perhaps of greatest importance, the "climate" of labor relations.⁵

Kelch (1977) utilized as an independent variable a measure of available labor supplies (stocks) constructed by Stoll (1977), which attempted to estimate supplies of manpower that would be available for employment if there were job openings. It assumed labor force participation rates equal to national norms for populations of similar age, sex, race, education, and prevailing wage rates.

Results of the regression analysis did not uniformly support the view that differences in labor supply were important in explaining new locations. This was true despite large differences in the effective supply of unemployed labor (as estimated by the Stoll technique) among counties and regions. The supply of unemployed labor varied from as high as 80 percent of the official labor force in Owsley County, Kentucky to situations in which employment was slightly greater than the estimated effective labor supply.

The McMillan (1965) distinction between determinants of the region of location and determinants of a specific location within a region may be one key to this riddle. Another may be the large degree of commuting, itself partly a product of improved roads. If the potential commuter shed extends outward for forty or fifty miles, the importance of differences in available labor supply (in Stoll's operational definition) at various loci within the total commuting shed may be relatively minor in relation to the labor requirements of the plant in most regions. Thus, while labor costs may be very important as criteria in choosing a location, labor supplies within the immediate area (county) being considered may not be important.

Another hypothesis is that differences in proportions of skilled and unskilled labor and differences in general productivity of the unskilled labor in industrial uses may be inversely associated in varying degrees with the effective level of unemployment, thus obscuring the relationship.

The combination of movement to rural areas and movement of manufacturing to the South, especially manufacturing of the labor-intensive kinds, and the overwhelming expression of opinion by management appear to make a strong case for the importance of labor supplies in explaining the industrial growth of broad regions. The importance of specific county labor supplies to specific locational selections remains somewhat obscure. However, it is obvious that simply having large numbers of available workers does not comprise a sufficient basis for rapid industrial growth--evidently other conditions must also be met.

Summary

Trend information, locational preference data and statistical analysis of plant locations tend to support a common conclusion. Preferences of industrial investors have shifted toward rural locations for new or relocated plants, especially toward rural locations in the South. One must conclude therefore that either the case in support of agglomerative externalities has been overstated or that compensatory changes have occurred which reduce their relative importance. It seems likely that inducements will be more effective in the immediate future than heretofore if recessionary problems are overcome and moderate growth rates resume.

Among rural locations within the South, agglomerative influences appear to be relatively unimportant in the sub-metropolitan population size range. Within distance ranges found in Tennessee and Kentucky, proximity to a metro area is not of decisive importance; hence, fairly diffused industrial growth seems feasible, and, indeed, is occurring (Kelch, 1977, p. 119).

Effects of Governmental Policies on Rural Area Potential

The relative advantage of rural areas *vis à vis* large urban centers in competing for industrial investment is, of course, affected by state and federal governmental policies. Some of these provide financial assistance to local governmental units, through either grants or credit, to develop local public services, industrial sites, etc. Others provide enabling legislation permitting local governments to offer special inducements to industry. Still others, such as procurement policies of the Defense Department or other agencies, environmental protection policies, minimum wage laws, and collective bargaining regulations have more or less inadvertent effects. Laws relating to responsibility of local and state governments for such programs as school financing, indigent care, and adult vocational education all have potential effects, either direct or indirect.

Research having some peripheral bearing on the impacts of these policies on rural area industrialization is almost limitless. It covers such fields as educational administration, social and educational psychology, public finance, and several others. We limit our review here to a small number of factors that appear to have had rather direct bearings on rural industrialization potentials. Research bearing on policies that provide resources and/or enabling legislation to allow local governments to take individual action to improve their competitive position as well as those policies involving direct actions will be considered. In this study, we will review research that bears primarily on: (1) highway and transportation policy; (2) taxation; (3) financing; (4) collective bargaining and labor relations; and (5) education and other public services.

Highway and Transportation Policy

It can scarcely be questioned that the development of improved, faster, lower cost transportation has had an impact on the pattern of industrial development. The historical concentration of industry in the northern and eastern states can be traced directly to the geographic distribution of natural resources, access to water transportation, and especially to the layout of rail lines. However, our immediate concern is with recent change.

We have noted in previous sections that, in general, improved transportation seems to have reduced considerably the agglomerative economic advantages of larger cities, at least for labor-intensive industries. Further, as suggested by Kelch (1977), there is no consistent evidence that Tennessee and Kentucky communities located near metro centers currently enjoy significant competitive advantages over those more remotely located. However, two factors related to highways have not yet been discussed in detail: (1) the importance of developed local roads; and (2) access to the interstate highway system.

The local road system would appear to be of some potential importance with respect to determining the size of the commuting area and, hence, the short- or intermediate-term labor supply. However, Smith et al. (1973, p. 17) found that "nonfarm rural-resident participation in activities away from home and access to public services are not greatly affected by residence on unimproved roads. Residents of areas served by unimproved roads make about 15 percent fewer trips away from home than do people of similar characteristics living on all-weather roads. Travel outside the county . . . [is] also not affected by road improvement."

More recently, a regression analysis of commuting patterns found no statistically significant difference between Appalachian Kentucky and the remainder of the state despite the relatively higher proportion of non-allweather roads and rugged terrain in Appalachia (Van Veen, 1977, p. 85). The only conflicting evidence was relatively weak and indirect. Kuehn and West (1971, p. 25) found that "the only highway type even moderately correlated with full time employment . . . was local roads." We may infer from this that deficient rural roads have little bearing on labor supplies, and, hence, little relation to industrial growth.

Kelch (1977) indicates that the effects of access to an interstate highway or toll road are generally significant. They increase probabilities of new industrial locations in counties in the two-state region by an average of 6.8 percent. However, for reasons that have not been identified, this was not true of the eastern Tennessee and Cumberland Tennessee regions. The general evidence from Kelch is consistent with the EDA (1973a) survey results, which indicated that 76 percent of firms surveyed rated access (within 30 minutes) to a major highway as being of "critical" or "significant" value. Oehrtman et al.

(1973) found that transportation facilities in general were significantly associated with growth of manufacturing employment.

A question can legitimately be raised regarding the role of highways vis à vis other factors in the process of industrial development. Increased frequency of location depends, of course, on whether other elements such as labor supplies of appropriate quality, suitable sites, adequate water supplies and sewage services, etc. are initially present or subsequently developed. The relationship between highways and these other factors would appear to be complementary. As Kuehn and West (1971, p. 27) note: "As suggested by others, the probability of success is dependent on existence of a prior dynamism of the region. The investment in highways must be part of a cluster of change."

The Kelch model (which is currently being refined and respecified) does not capture these complementarities and, hence, provides but a limited basis for projecting the effects of present and future highway developments on industrial locations under other environing conditions greatly different from average. Emphasis here is on the interstate highway program, the Appalachian Regional Commission (ARC) efforts and the various state toll road systems.

Kelch's previous model also seems likely to generally understate the potential impact of these highway investments on industrial growth. The impact on communities with only indirect access to interstate or toll systems but with access to well-constructed state or federal "feeder" highways is not included in the analysis. This has the effect of both understating the impact on communities with immediate access as well as failing to capture broader regional impacts. Considering these elements, it seems reasonable to conclude that the major highway systems, at least in Kentucky and Tennessee, have significantly improved the potential for industrialization of rural areas in general.

Whether this experience can be extrapolated to areas not served by the interstate system, or, indeed, whether alternative investments in conventional schooling, vocational training, and other human resource-oriented projects or direct financial inducements would have a higher economic development payoff is much more a matter of judgment. Judgment and systematic analysis are complicated by the multi-purpose nature of both road and human resource investments and the very long-term nature of some of the return. However, it must be noted that the short-term added manufacturing job-to-cost ratios are not encouraging (Hansen, 1973, p. 24), and it must be recognized that highways are very expensive, especially in areas of mountainous terrain.

Taxation

Issues of financing and taxation cannot be completely separated since the use of either industrial revenue bonds or general obligation bonds as a means for extending low-cost financing provides the opportunity

for property tax concessions that would otherwise be illegal in many states. In issuing such bonds, the local government usually retains ownership of the property under a long-term lease-purchase contract with the firm. It can contract for rent, which does not include allowances for foregone tax revenues; this action has the same effect as granting an overt tax holiday.

Tax Concessions.--Tax concessions other than those included de facto as part of lease-purchase financing agreements take various forms. They are specific to the firm or firms to which they are applied, a clearly discriminatory form of subsidy. As such, they require specific legal authorization which is not uniformly available. As of 1963, according to Bridges (1965a), fifteen states authorized such concessions. However, there are clues that some such arrangements are handled on a sub rosa basis by reducing property valuations for tax purposes. The extent of this practice is not evident. However, all concessions, of whatever form, must be carefully distinguished from explicit differences in general tax levels and general undervaluations of property for tax purposes, which apply equally to all individuals and property subject to taxation.

Real and personal property tax concession inducements are not in principle different from direct grants, reduced rentals on public property, etc. They, in effect, reduce costs by a fixed amount and are a subsidy not enjoyed by other firms. As such, the general theoretical and empirical literature on industrial subsidies, which mainly began with Moes (1961), Rinehart (1963), Laird and Rinehart (1967) and their several critics, is pertinent to the subject of tax concessions. As a matter of public policy, the issues relate to: (1) the cost-effectiveness of such subsidies as a means of inducing greater income and employment through industrial growth; (2) the economic efficiency consequences or productivity consequences, if cost-effective; (3) the public opportunity cost and net fiscal effects of these foregone revenues; and (4) distributional or equity considerations. All but the first are matters concerning the impact of such policies. The economic efficiency issue has apparently been resolved as a public issue by introduction of a variety of public programs aimed at the alleviation of poverty, i.e., programs that have generally recognized adverse (short-run) economic efficiency implications. Critical review of the fiscal, distributional, and equity impact considerations is covered in a companion paper. Therefore, we confine discussion here primarily to the cost-effectiveness aspects of such concessions.

Obviously, tax concessions are much more cost-effective as compared with reduced general tax levels; they target on specific potential clients or locatees, rather than on all real and personal property, all payrolls, all sales of general classes of goods or on all corporate profits.

Stinson (1968), in reviewing the existing literature, notes four classes of studies: (1) surveys of business firms to estimate the importance that top management attributes to these inducements; (2) assessments of

the importance of taxes as a cost factor, i.e., as a proportion of total costs compared with differences in other cost factors; (3) comparisons of growth rates in areas with various levels of taxes (presumably including statistical studies); and (4) experience of public or private individual development and consulting agencies. Unfortunately he does not distinguish between concessionary tax exemptions and differences in general tax levels, although the studies cited and the context suggest a primary concern with general tax levels.

Stinson (1968, pp. 2-3) notes the fragility of survey results due to: (1) difficulties of anticipating what corporate management personnel would consider ex ante; (2) difficulty of remembering what was important ex poste; (3) bias introduced by design of survey schedules; (4) failure to distinguish among phases in the selection processes; and (5) exclusion of small firms, etc. Nevertheless, in reviewing eight such studies published in the 1957-1966 period, Stinson (1968, p. 7) concludes that "taxes do not play a large part in location decisions of most firms, and in those instances where taxes do enter the analysis, their effect on the final decision is normally small."⁶

Bridges (1965b, p. 191), in reviewing literature of about the same period, concludes that these and other "financial inducements of the type now in common use [are] certainly a secondary factor in the choice of location within a region and . . . probably a secondary location factor in the choice of a region." He further suggests (p. 192) that the importance of them may be both economic and psychological in that they "might noticeably improve the state's image in the eyes of business officials."

More recent studies by Montello (1969), the EDA (1973a), and by Turner and McGee (1972) generally lend support to the view that taxes are, indeed, a secondary and possibly only a minor factor in such decisions. In the EDA study the question was specific to tax concessions. Eight other factors were mentioned as being of "critical" or "significant" value as frequently or more frequently than tax concessions. Montello's (1969) study ranked taxes (in general) as fifth in importance.

We are only aware of studies by Stober and Falk (1967, 1969), Stober (1970), and Morgan and Hackbart (1974) on the quantitative analysis of the importance of exemptions or concessions relative to costs or profitability. Morgan and Hackbart (1974, p. 204) conclude that "other inter-locational cost differentials are generally more important than tax differentials."

The studies by Stober and Falk (1967, 1969) were based on somewhat more sophisticated and rigorous analysis using a synthetic mathematical model. Again, however, the conclusion is that, given the present structure of taxation, property tax exemptions are very ineffective as inducements, compensating for only an extremely small proportionate difference in construction costs.

A final factor noted by several authors is that tax inducements have the potential of becoming a highly competitive factor, with the effectiveness of one community's tax concession being offset by those of others. Their level of effectiveness is of course heavily dependent on limited use of this tool. Yet this does not necessarily mean, contrary to Mulky and Dillman's (1976, p. 41) statement, that "if they are employed by all communities (or states) within a region, no one locality may gain through their use." Assuming that there are differential levels of externalized benefits, this is a false issue. If communities act rationally, their choices regarding these subsidies will reflect differences in levels of anticipated benefits, and the greater the level of underemployment, other things being equal, the greater will be the localized benefits.

All factors considered, the current prohibition of preferential tax treatment by several states seems wise in view of the high opportunity costs of local governmental expenditures. This is especially true in those states with low per capita incomes and low tax base per capita. Even the de facto concessions that are part of bonding and lease-back packages seem on the basis of the available evidence to be of questionable value relative to other "investment" options.

General Taxation Levels.--General levels of taxes are specifically and separately analyzed by very few surveys. Most studies of general levels of taxation are based on quantitative estimates of their cost impact. Due's (1961) early survey of the literature and empirical findings resulted in an estimate that the range of state and local taxes would translate into a average of 0.3 percent of sales and 0.5 to 1.5 percent of value-added. Due (1961, p. 171) concludes that "on the basis of all available studies . . . relatively high business taxes do not have the disastrous effects claimed for them . . . they suggest very strongly that the tax effects cannot be of major importance . . . in some instances the tax element plays the deciding role in determining the optimum location . . . But state and local taxes represent such a small percentage of total costs that [they] . . . cannot be very important."

Stinson (1966) summarized three studies of cost impacts of tax differences among areas.⁷ These studies compute tax differences among western states and among communities within them in several ways: (1) as a percentage of total costs; (2) as a percentage of stockholder equity; and (3) as a percentage of costs that would allow different profit levels. His conclusions are in exact accordance with the later analysis of exemptions of Morgan and Hackbart (1974). Stinson (1968, p. 13) says that "geographical variation in costs for other factors, such as labor, transportation, and raw materials, is so much greater than the variations in tax costs that, under normal circumstances, the firm would seldom consider the tax burden of a particular area. In many instances the increase or decrease in tax cost for a new location was less than 5 percent of total geographically variable costs of the firm. This finding supports those who believe that tax costs are of minimal importance to

firms that relocate. Stinson (1968, p. 14) states that "... tax costs are of secondary importance, . . . however, . . . tax differentials may affect growth of new firms [and] . . . may be rather large in terms of their effect on the revenue of the [less profitable] firm."

This body of evidence notwithstanding, there is some contravening evidence. Due (1961, p. 164) notes that in a study by the Federal Reserve Bank of Boston, 25 percent of the respondents stated that location decisions would be influenced in some degree by tax levels. Moreover, he cites U.S. Department of Commerce data on rates of employment growth that are inversely correlated with reputation as high tax states, possibly indicating a degree of irrationality based on the symbolism of an unfavorable business environment (p. 170).

The Tax Concession Issue Reconceptualized.--While we generally accept the conclusions of Due (1961), Stinson (1968) and Morgan and Hackbart (1974), and others, there is an important conceptual inadequacy in all of these analyses. Although Tillman (1971) reasons by analogy to the concept of minimum critical mass in physics, a simpler approach recognizes that industrial growth can be viewed from the standpoint of a production function, with the marginal contribution to industrial growth of each "resource" depending both on the previous level of application of the specific resource and that of all other resources.

If viewed from this perspective, generalizations about the "comparative importance" of various factors have only vague meaning; that is, it is of little value to state that tax cost differentials are exceeded by labor cost differentials, transportation cost differentials, or capital cost differentials per unit of value-added or output. What does matter is whether: (1) the marginal cost-effectiveness of a tax concession is smaller or larger than some other policy action for the aggregate of industries of interest; and (2) whether its value is greater than its opportunity cost in terms of alternative means of adding to income and employment of the target population.

From the standpoint of evaluating public programs aimed at alleviating poverty, it also matters whether these marginal contributions are greater or smaller in areas of greatest poverty than in more affluent areas. If the marginal contribution to new industrial employment and incomes is higher in relatively affluent areas with abundant fiscal resources, authorizing legislation may have results opposite from those intended. This applies not only to states or to regions, but most particularly to specific communities. Kelch (1977) provides estimating equations, which when applied to many rural communities, suggest that such changes as a tax holiday or development of industrial sites would individually be insufficient to make the probability of obtaining an industrial location in a specified time-period large enough to be acceptable as a risk. In contrast, for those communities in which present resources suggest a 75 percent probability of attracting a new plant location in four years, the tax concession or site development may

convert an already high probability of location into a probability that is entirely acceptable as a community risk.

Beyond this, low taxes may often be the other face of a low quality public services "coin." For the apparently increasing proportion of industries that highly value good scholastic preparation of their labor supply, good health services, recreational and school facilities for the families of key employees, and other advantages, a few thousand dollars in tax costs may be a comparative bargain if generally applied to the entire tax base. The added services that they support may contribute to higher morale among managerial and professional workers, more rapid development of labor skills, such as an increased ability to follow written directions, less sick leave, and less absenteeism, all of which are reflected in profit and loss accounts.

Financing Policy

According to conventional economic theory, capital is assumed to flow through loan transactions to its most productive use; however, in an imperfectly competitive world with uncertainty about productivity of investments, access to capital is subject to restrictions. Rules and policies of institutional lenders limiting the acceptable level of risk of nonrepayment may exclude many potential borrowers who have inadequate property to serve as collateral. These may include industrialists who are proposing to invest in manufacture of new products for which markets are not yet fully developed, or who do not have a diversified output to cushion losses in one product line.

State and Federal Loan Programs.--The Small Business Administration, Office of Economic Opportunity, Farmers Home Administration, Banks for Cooperatives, Rural Electrification Administration, and a variety of other federal and state agencies supply credit either directly or indirectly to industrial clients meeting their criteria. Some also make loans or grants to municipalities for such purposes as developing industrial parks or adding utility capacity.

However, research literature on the effectiveness of such state and federal loan programs as aids to industrial development in rural areas of low income is extremely limited and nonrigorous. The number of loans and the amounts loaned are, of course, inadequate bases for evaluation since it is not evident how much of the lending activity merely represents substitution of low interest for higher interest credit (Stinson, 1968). Neither do the totals of firms financed in rural areas indicate how many would not have located there in the absence of access to these loans. Only one clear impression seems to emerge from reviews of information about such loan programs: they are more often of importance to relatively small, "home grown" and independent manufacturing operations than to development of branch plants of larger conglomerates and large-scale specialized manufacturers. This is supported by Gold (1966, p. 291) in his study of a Pennsylvania

financial aid program which notes the relative difficulty of small firms in obtaining credit from conventional lenders. Stinson (1968, p. 20) notes that "many economically feasible loans are not considered for private financing." Later: "structural problems apparently limit the ability of small firms to obtain credit . . . State development and loan guarantee programs may be ways in which both the credit gap and information gap can be reduced for new firms." Bridges (1965, p. 190) suggests that the high cost of credit investigations for small firms may be a problem and that small firms in rural areas may have more difficulty in securing long-term credit than those in urban areas.

Despite the possibility of substantial impacts on profitability of larger and more secure investments in rural areas, one is left with the distinct impression that loan and loan guarantee programs impact primarily on small, new, somewhat speculative ventures. In this respect their total potential impact is almost impossible to assess with confidence. Nevertheless, they probably have somewhat greater impact in rural communities than in urban areas, and may contribute to some degree toward the tendency of industry to move toward the country.

Bridges (1965b, pp. 177-183) calculated savings as a percentage of value of shipments for differing classes of products for several levels of interest on all depreciable or depletable assets. With a 4 percent interest rate reduction applied to gross assets, savings ranged from as little as .36 percent to 1.92 percent. If based on net assets, the figures were reduced to modest levels, ranging from 0.14 to 0.93 percent.

Are these modest savings necessarily small inducements? They could represent an extremely large difference in return on equity capital if the proportion of net worth represented by equity is small, and if value-added is small relative to value of shipments. That is, if value-added is only 25 percent of value of output, a savings on the value of shipments at the rate of 1 percent converts to a 4 percent change in cost per dollar of value-added. If additionally the ratio of value-added to equity capital is 4 percent, this converts to a 16 percent change in return on equity capital, a distinctly attractive amount. Thus, the significance of the low-interest loans depends greatly on the financial structure of the firm, as well as on the contribution to the total value of its output.

Cost considerations aside, as many sources indicate, manufacturers locating in rural areas are typically rather small. For these, the "structural gap in the private lending system" to which Stinson (1968) refers appears to be greatest, especially for new firms. He cites Bridge's (1965b) evidence that private development corporations have enjoyed profit rates and public loan and loan guarantee programs have had repayment records comparable to commercial credit agencies. Thus, they must be filling a structural gap rather than accepting higher risk, less profitable loan accounts.

Local Government Bonds.--The most frequently used forms of low-cost financing appear to be various types of bonds issued by local governments. The terms "industrial aid bonds" or "industrial development bonds" include both industrial revenue bonds and obligations of local governments issued to raise revenue for financing industrial clients. The term industrial revenue bonds refers to bonds that are issued by the city or county obligating the rental income of the sites, buildings, operating equipment or emission control equipment financed in repayment of interest and principal on the bonds. Bond interest income up to maximum issues of \$5,000,000 per firm is exempt from federal income tax, resulting in interest rates below usual market rates. The municipality or county government is not obligated for repayment of the bonds beyond the proceeds of the long-term, lease-purchase contract under which the firm gains use of them. Thus, these bonds are risk free to the local government. For a three-year period before and after negotiation of the contract for construction, the company or its affiliates cannot exceed a total capital outlay of \$5,000,000. Neither can it avoid this by leasing arrangements.

In effect, the \$5,000,000 limit means that the system is favorable to relatively small plants or to firms that are not capital-intensive. Hence, they are perhaps somewhat better adapted to firms likely to locate in rural areas than in metro areas, i.e., smaller and less capital-intensive operations.

While the research literature on industrial revenue bonds is relatively large, the most rigorous analyses of their effectiveness in reducing costs are found in the works of Stober (1970), and Stober and Falk (1967, 1969). Kelch (1977) has analyzed the effectiveness of these bonds in increasing frequencies of industrial locations.

The EDA (1973a) survey data suggests that revenue bond financing is not an important factor in attracting industry. However, Stober and Falk (1969, pp. 26-29) note that there are several economic advantages of this system in addition to the exemption of interest income from taxation; the property is also exempted from ad valorem taxes (unless the lease-purchase agreement provides for equivalent payment). Further, rental charges are tax deductible as costs, in contrast to dividends on stock, which are taxable as corporate (and personal) income.

Stober and Falk (1969) use a synthetic mathematical model, which takes into account these advantages as well as the income tax status of capital outlays, investment tax credits, and normal depreciation to show the relative cost effects of revenue bonds and other costs. Under one set of assumptions, with depreciation and maturity periods of 30 years, "bond financing could erase a 60 percent construction cost disadvantage even when the investment tax credit is applicable to the entire investment." Stober and Falk (1969, p. 32) note that, "for more capital-intensive industries . . . the magnitude of labor cost differentials that would be eliminated by bond financing alone are quite substantial" (p. 34).

Stober and Falk's analyses demonstrate the important cost consequences of revenue bond financing, especially for capital-intensive operations. However, it is recognized that a large supply of labor has resulted in relatively labor-intensive industry moving to rural areas. Moreover, it is not evident from the EDA (1973a) data that management recognizes the advantages of revenue bond financing. Behavioral evidence such as that found in Kelch (1977) provides potentially more definitive tests.

Kelch's regression (linear probability function) model indicates that, overall, revenue bond financing is among the most effective policy tools available and certainly highly cost-effective. It is virtually without cost or risk to the community. However, results are not completely uniform among regions, being marginally significant in Appalachian Kentucky, and nonsignificant in Cumberland Tennessee and eastern Tennessee. Strangely, the regressions indicate a somewhat closer association between availability of revenue bond financing and locations of labor-intensive industries than for firms that are not labor-intensive. The explanation may be that labor-intensive firms tend to be independent, small-scale operations in a higher proportion of cases.

On balance, the authorizing legislation for revenue bond financing appears to have been advantageous for industrial development in rural areas. Given such features as interest income tax exemptions, the treatment of rentals as costs to the firm, among other advantages, the use of industrial revenue bonds appears to be a powerful asset for rural communities. Limits on the size of bond issues and total capital outlays per firm in each county make this particularly favorable to smaller plants, which in many ways are better adapted to the labor supply and public service complement of rural areas than are large plants. In this respect, contrary to Mulkey and Dillman's (1976) general conclusion about the effects of the \$5,000,000 upper limit in reducing the effectiveness of this policy tool, it may have increased the advantage of smaller rural communities vis à vis urban areas.

In contrast, general obligation bonds deplete bonding capacities of local governments that might be used for alternative purposes and have few, if any, advantages. No research specific to their effectiveness has been discovered and no further attention will be given to them here.⁸

Collective Bargaining and Labor Relations

There has been some speculation that deterioration of labor-management relations has been a strong factor contributing to industrial movement away from urban areas. Allegedly, this has been associated with declining productivity and higher labor costs per unit of output in developed industrial centers. If this is true, it is obviously in part a product of state and federal policy with respect to collective bargaining.

Direct evidence on this factor is extraordinarily scarce. The EDA surveys (1973a, 1973b) do not even have a category of response relating to it, possibly due to the political sensitivity of the subject. Mueller and Morgan (1962) and several other surveys include information about the relationships between labor costs and unionism and planned or past new locations, locations for expansions, or planned relocations. Labor costs and unionism, a combined category, was one of the three most important considerations for all categories of locational decisions. Other writers, including Turner and McGee (1972) and Bergen and Eagan (1961) tend to support the same general conclusion. One regression model in the Kelch study (1977) indicated that average county wage levels were marginally significant influences on industrial location; however, data on unionization of the labor force are not available on a county basis. Moreover, a large number of references may be found in the literature suggesting that the fact of union activity is of less importance than its quality and strength. Rates of growth in manufacturing in the major coal counties of Appalachian Kentucky have been low, and their labor history is well known. However, this evidence is not conclusive; it is, at best, suggestive of a negative impact of unionization.

The present permissive policy, which neither precludes union organization nor encourages it in areas of high underemployment, seems to be favorable to rural area industrial growth. Except in areas with an established reputation and tradition of militant unionism, such as the coal mining areas, wage rates appear unlikely to be greatly affected by union activity. An area with a large pool of unemployed labor is seldom a good environment for collective bargaining.

Education Policy

Education policy may affect both the quality of the labor force and the attractiveness of the community as a place for company officials and key employees to live.

Over the past three or four decades, changes in policy at both the state and national levels have tended to equalize financial support for education among rural areas and between rural and urban districts. To an increasing degree, federal and state financing compensate for the differences in tax base and ability to pay among states and school districts. However, substantial differences still exist; the average expenditures per pupil in the five Kentucky and Tennessee regions range from \$326 to \$537 per pupil (Kelch, 1977). Whether ranges in quality of instruction are as great as per pupil expenditures is more questionable. Further, it is not evident a priori whether general scholastic skills or specific vocational skills are the more important aspects of education or training in the longer run. One would expect this to be quite variable among industries. Training programs to develop specific lower level skills useable by industry are commonly offered by state vocational education agencies, but their importance as inducements to industry have

not been rigorously evaluated.

Clues regarding the importance of these differences are provided by several studies. Weighted rankings of locational factors in the study by Montello (1969) assign relatively low status to all categories of education for production operations. Labor supplies, markets, taxes, proximity to other company facilities, and proximity to natural resources are more important. This, however, conflicts with implications of the EDA survey (1973a), which indicates that "pool of skilled workers" is more frequently of "critical" or "significant" value than "pool of unskilled workers."

Kelch (1977) found an estimated average 4.4 percent difference in probability of attracting one or more industries associated with each \$100 of difference in expenditures per pupil for all Tennessee and Kentucky communities in the four-year period 1970-1973. However, in some regions, differences in expenditures were not statistically significant. Moreover, of the several types of local services, the Kelch model included only this and fire protection rating. Hence, they may serve as proxies for a broader array of public services, the quality of which may be correlated with educational and fire protection expenditures.

The evidence is, at best, inconclusive regarding the importance of the remaining disparities in educational outlays in terms of their effects on industrial location. Hence, we have an inadequate basis for evaluating the importance to industrial investors of changes in state and federal educational financial support that have narrowed these disparities. This is true despite the evidence that investments in the development of human resources is an essential part of general economic development programs.

Support for Improved Public Services

Partly as a matter of explicit policy (Area Redevelopment Act, Rural Development Act, programs of the Economic Development Administration, etc.) and partly as a byproduct of other programs (especially Environmental Protection Agency), additional federal support has been provided for improved solid waste disposal, sewer, water, and other local services. Since these services have been most deficient in rural areas, one might expect these programs to impact more heavily on such regions than on urban centers.

Unfortunately, there is no direct evidence available, so far as we know, on the influence of these policies on rural areas either in the aggregate or on the specific communities that have utilized them in upgrading their local services. Such information as we have results from either general observations (for example, Tillman, 1971), or from studies relating community characteristics to economic growth rates (such as Bergen and Eagen, 1961). However, the mix of services supported by

governmental programs varies from health, nutrition, and adult education to streets, sewers, and water supplies. Hence, a quantitative assessment of their general importance or of the most efficient combination is extraordinarily difficult.

Factor analysis techniques have been applied to the "measurement" of the general quality of local services, both public and private, by Stoll (1977) in his analysis of plant growth. He then utilizes the service quality factor score in a regression model to evaluate the effect of service quality on plant employment growth rates. However, had such factor analyses techniques been employed in plant location studies, interpretation would still have been difficult. For example, it would not have been possible to relate the quantity of investment in such services to the rate of locations in the Kelch study. Moreover, there would have been no means for evaluating which specific services have the highest rates of industrial development payoff. Only those services (water and sewer) contributing directly to the quality of industrial sites are reasonably susceptible to quantitative evaluation, and these only partially and imperfectly so, as later discussion of community action will point out.

In summary, the quality of those public services not specifically related to physical characteristics of industrial sites have not been satisfactorily evaluated as locational determinants. Generally, both scholars and agency personnel support the view that they are "somewhat" important. Mulkey and Dillman (1976, p. 37) refer to community living conditions, pollution problems, local support for schools and health systems, and local recreational opportunities as being "less tangible factors that enter into all industrial location decisions." Hence, governmental policy to support service improvements appears to enjoy fairly general support. Unfortunately, satisfactory systematic studies verifying these impressions are not available.

Technical Assistance and Promotional Support

Almost all states provide technical assistance and direct service to help organize and support local promotional agencies and governmental units in industrial promotion efforts. Services often include a clearinghouse function whereby industrial clients can readily identify communities with the requisite characteristics and resources for their operations. In addition, almost all agencies that supply financing for either industry or community projects in support of industrial development supply some of these services.

The importance of these services has not been systematically appraised in any of the research literature so far as we know. It is doubtful that their contribution can be disentangled from the other factors contributing to industrial growth.

Local Community Action in Support of Industrial Development

Community action in support of industrial development is carried on by local governmental units, voluntary organizations, private business organizations, and combinations of these. As noted earlier, many of these activities are facilitated by state and federal policy decisions, effected through provision of resources or by authorization of local action such as bond financing.

Establishment of Promotional Organizations

Promotional organizations in local communities are often committees or subunits of general civic organizations, such as a local Chamber of Commerce. They may embrace a single community or an entire county. When property transactions are contemplated, such as acquisition of industrial sites or parks, they are ordinarily incorporated, usually as nonprofit corporations or foundations but occasionally as corporations for profit.

The importance of the organization as a facilitator of information flows, etc. is not easily disentangled from its specific direct actions or policies. The EDA survey (1973a) indicates that neither such organizations nor industrial bond financing, an action often promoted by these groups, is important to locational choices. However, a companion EDA survey (1973b) of manufacturing plant characteristics appears to indicate that: (1) about half of the firms responding were based in metropolitan areas; and (2) these firms are on the average larger than those in rural locations. For both reasons, EDA respondents may have had less need for assistance of such organizations than those considering rural locations for plants.

Kelch (1977) separately tested for the influence of such organizations on industrial locations in rural areas. His regression model, which included a dummy variable to indicate the presence of a development organization, showed no positive net association with frequency of location except in eastern Tennessee. However, nearly four-fifths of Tennessee municipalities and more than three-fifths of those in Kentucky had their own development organizations or were served by a county-wide organization. Moreover, the availability of bond financing, industrial sites, and optioning or ownership of industrial sites were all somewhat associated with the presence of a development group, as expected. Field observations during data enumeration suggested that very few organizations conducted active recruiting campaigns without also preparing industrial brochures with potential sites designated. Hence, those without sites, and/or financing were, in general, "paper organizations" only.

The significant associations between locations and site availability, site acquisition or optioning, site quality, and bond financing offers may be somewhat confounded with the higher levels of informational and

other activities of supporting organizations. In any event, there was no positive evidence of effectiveness apart from those identified activities and availability of somewhat better-than-average sites.

Site-Related Activities

Kelch's (1977) results represent the only rigorous attempt to assess the independent effects of: (1) identifying industrial sites (in a formal document or brochure); (2) optioning them or acquiring them; and (3) developing them to higher quality levels in terms of land area, water and sewer service, and rail access.

In the aggregate, all site-related activities were significant in explaining new industrial locations. Although a small number of plants located in communities with no designated sites, these communities had no better experience than communities whose best sites were equal to the lowest quality sites on which plants actually located during the 1970-1973 survey period (quality index = 0).

The effectiveness of these community actions to designate, acquire, and/or improve the quality of available sites appears to have been quite different among regions. The mere act of designating and describing available sites in a brochure seems to have contributed relatively little, given the differences in quality of the sites, their ownership and other factors that existed in these areas. The only exception occurred in western Tennessee. Differences in site quality and in control (by a nonprofit group or governmental unit) seem to be fairly important overall, but they appear to have statistically significant importance only in the western Kentucky communities.

It is important to note that Kelch's study shows no evidence that any community action related to industrial sites has contributed to industrial locations in eastern Kentucky, Cumberland Tennessee, or eastern Tennessee. Eastern Tennessee is the most rapidly growing industrial area in the two states; the other two regions are the least rapidly growing. This may suggest that areas proven to have a highly favorable general climate for industry add little to their attractiveness by these activities. Others with very unfavorable climates may be ruled out by many firms before details of community actions of this type are considered. However, at this time, the evidence is suggestive rather than conclusive.

Site-related factors such as site size, soil load bearing capacity, industrial water supply, and industrial sewage processing were rated by EDA (1973a) survey respondents as being of critical or significant value (62, 36, 43, and 46 percent, respectively). These data tend to support the view that site quality is important to location, especially for larger firms.

Financing

There appears to be little evidence of significant amounts of direct lending to industrial clients by rural communities. Apparently loans are extended primarily by federal and state agencies or larger cities.

While there is some general obligation bond financing of industrial structures and equipment, very few rural communities appear to have enough surplus bonding capacity to make this an acceptable general strategy. Industrial revenue bonds are far more popular and with good reason; as noted earlier, they are largely without cost or risk, and they do not reduce bonding capacity. Moreover, as we have noted before, the lease-purchase contract usually employed in these financing operations converts what would be taxable income if used to amortize debt into a tax deductible cost (except for capital gains tax in the event of sale).

Kelch (1977) confirms the conclusions of Stober and Falk (1969) that industrial revenue bonds are a strong inducement to industry, adding substantially to the probability of attracting a new plant location. In the two-state area studied, a 19 percent increase in probability of one or more locations over the four-year period was associated with availability of revenue bond financing.

Public Services

It is virtually impossible to evaluate individually the location effects of each specific class of local public services. Unfortunately, the effects of differences in quality of particular services of direct significance to industry may be closely associated with the quality of others. Thus, any statistical evaluation is hazardous.

Fire protection quality is viewed as being of critical value by 43 percent of EDA (1973a) respondents, with another 30 percent viewing it as being of "significant" value.

Kelch's (1977) regression analysis also supports the general conclusion that fire protection service is very important, although not consistently so for small plants, and not for eastern Kentucky and Cumberland Tennessee. The rather large differences in fire insurance costs associated with differences in fire protection provides an adequate explanation of its importance in locational decisions even for plants that are not capital-intensive.

Kelch (1977) found that higher expenditures per pupil in primary and secondary schools were generally associated with a higher probability of attracting industry, although not consistently so. Most surveys of management are not specific with regard to the importance of this and other local services. The importance attached to a supply of skilled labor in the EDA (1973a) survey suggests that educational quality may be important. On the other hand, additional local expenditures per

pupil mean additional taxes to support education. Thus, while the quality of the present stock of labor may be important, the discounted value of a gradually improved supply of quality labor may be less than its cost to many industries, especially those requiring only limited skills. This may account for the somewhat inconsistent findings among both management surveys and regression studies.

That local action to improve public services may enhance prospects for industrial locations by particular classes of industry is very likely. However, the available evidence does not support the conclusion that this is a locational determinant of extreme importance to all potential classes of rural industry as a group. Evidently direct action to provide high-quality sites with adequate utility services and availability of revenue or general obligation bond financing will, on the average, have a higher industrial growth payoff, at least in the relatively short-run period.

Summary

For many, but not all, rural areas, local action is now possible that will materially enhance possibilities for industrial growth. Financial, technical, and advisory services are available, which can be utilized by local governmental units. Some of these appear to increase the relative economic advantage of rural areas vis à vis major metro industrial centers. In addition, the improved highway system, state and federal aids to disadvantaged school districts, loans and grants for improvement of water, sewer, and other services appear to have put rural areas in a situation generally more favorable to industrial investment than was true of earlier decades.

That some areas are not yet in a position to effectively compete for new industrial employment opportunities is evident. Further, in some regions, the probable payoff from local actions to attract industrial investment is relatively low. However, for those communities with adequate supplies of labor of suitable quality as well as access to rail and good highway transportation, activities designed to develop good industrial sites with adequate utilities and provision of low-cost financing have a high probability of payoff.

Industrial revenue bond financing is a very effective tool that: (1) is virtually without cost to local communities; (2) involves no risk to them; (3) confers on industrial clients important tax advantages; and (4) is legally available to communities in most states. It also appears to be better suited to small communities that are likely to attract small industry than to larger urban centers.

It is undoubtedly true that improvement of several types of local public services will be required as a basis for industrial growth in many communities. However, other than fire protection, water and sewer services, and road access, all of which are specific to plant operation, the evidence gives us no clear indications of which public investment categories

have the highest level or likelihood of payoff.

Factors Affecting Growth of Rural Area Plant Employment

While expansion of existing industries is potentially a major source of employment growth, almost no research existed in this field prior to 1977. Stoll (1977) utilized factor analysis to provide an index of local public and private service quality. The factor scores were used as independent variables in a regression analysis to identify determinants of growth variations. He assumed that if all economic variables of importance were correctly appraised the growth of each plant would be at the anticipated rate and would reach planned capacity levels of employment at the time expected by the management. Under these conditions, differences in community factors of economic importance to that plant would have been taken into account in initial planning and would not explain deviations in rates of growth toward plant capacity employment targets. Planned capacity employment and changes in demand for the industry would be the primary explanators of changes in employment from year-to-year after establishment.

Findings from Stoll (1977) indicate that some classes of industry systematically exceed expectations with respect to employment after only a short life span while others systematically fall short of expectations as reflected in their statements of projected employment. For all industries as a group, these planned levels are met on the average by the fifth year after beginning operations (the first year of operation being defined as the year the work force equalled or exceeded 5 percent of planned employment).

Stoll (1977) concludes that decisions on plant locations are subject to substantial uncertainty with respect to future demand. This is reflected in significant associations between year-to-year demand changes and growth in employment. Moreover, there are other sources of miscalculation that make the growth path a highly uncertain one. In combination, nine variables hypothesized to be of economic significance, including planned capacity employment, demand, community services, wage levels, labor availability, transportation access, and manufacturing agglomeration explain only 42 percent of the variation (R^2) after six years of operations.

The regression analysis suggests that locational decisions, while subject to uncertainty, were not severely biased by any of these factors. Accommodative changes appear to be made to compensate for minor miscalculations in the early years of operation; however, generally speaking, by the sixth year differences in growth are not significantly related to locational or cost-related resource factors in the area of location.

The practical significance of this is that eventually the same community factors that are important in determining whether or not plants are established in particular locations also determine their economic success

and rate of growth. For example, availability of labor supplies (quantity only) seems to be somewhat over-rated, possibly because of deficient skills; however, after about three years of operation, accommodations are made (possibly training programs), which put these enterprises back "on track," and the former positive influence of manufacturing agglomeration is reduced to statistically insignificant levels.

A separate analysis of two SIC groupings with quite different labor force characteristics was also revealing. The first, a grouping of textiles and related products with large proportions of female employees, proved to be much more unstable or unpredictable with respect to meeting its growth targets (as well as systematically under-shooting them) than the second. The second large category, electrical machinery and nonelectrical machinery with mostly male employees, generally exceeded its planned employment and had much more predictable rates of growth. The regression model for the machinery category explained 82 percent of growth variation, or twice as much as for the other grouping.

The analysis by Stoll (1977) confirms what others have observed; namely, that "footloose" industries, while easier to attract, provide fewer jobs relative to their announced planned employment. In addition, their stability and the predictability of their growth falls far short of other more stable categories.

Notes

1/It would be possible to document these factual assertions with an impressive list of studies, but they are commonly accepted and are noted here only as reminder of an assumption in the basic argument.

2/Crushed rock, usually limestone, compacted by vehicular traffic.

3/As we have noted in a companion paper on the impact of rural industrial growth, evidence suggests that the short-term direct net impact on fiscal accounts is not large and depends heavily on the tax status accorded industrial property. However, this analysis does not take into account changes in dependency ratios and economies of scale in public (and private) services, since, in most cases the additions to employment are relatively small. See: Eldon D. Smith and Gene Summers, "How New Industry Affects Rural Areas--A Review of Research" (manuscript being prepared under grant from the Southern Rural Development Center). Lexington: University of Kentucky, Department of Agricultural Economics, 1977.

4/Discrete choices were not required on this latter question and nonresponse rates were 24, 19, and 19 percent, respectively.

5/The concept of the labor force embodied in Labor Department data considers only that portion of the labor supply actively seeking work. There is no recognition of those who do not actively seek work because they have prior knowledge that jobs are not available. Quality is not readily measured because it must be related to the specific assignments or tasks required of the workers. Excellent farm workers, for example, may find difficulty accommodating to industrial regimentation.

6/Studies by Bergen and Eagen (1961), Hunker and Wright (1963), McMillan (1965), Mueller and Morgan (1962) McGraw-Hill Research (1964), State of Oregon (1957), Speigelman (1964), and Strasma (1959).

7/Studies were by: Stockfish (1961), Washington State Department of Commerce and Economic Development and Washington State Tax Commission (1963), Wonnacott (1963).

8/Mulkey and Dillman (1976) list in addition to federal and state loans and loan guarantee programs for construction of new or relocating plants several specialized types of loans for equipment, matching funds for local communities, and incentives for establishing plants in areas of high unemployment. As of 1972, 44 states authorized revenue or general obligation bond financing.

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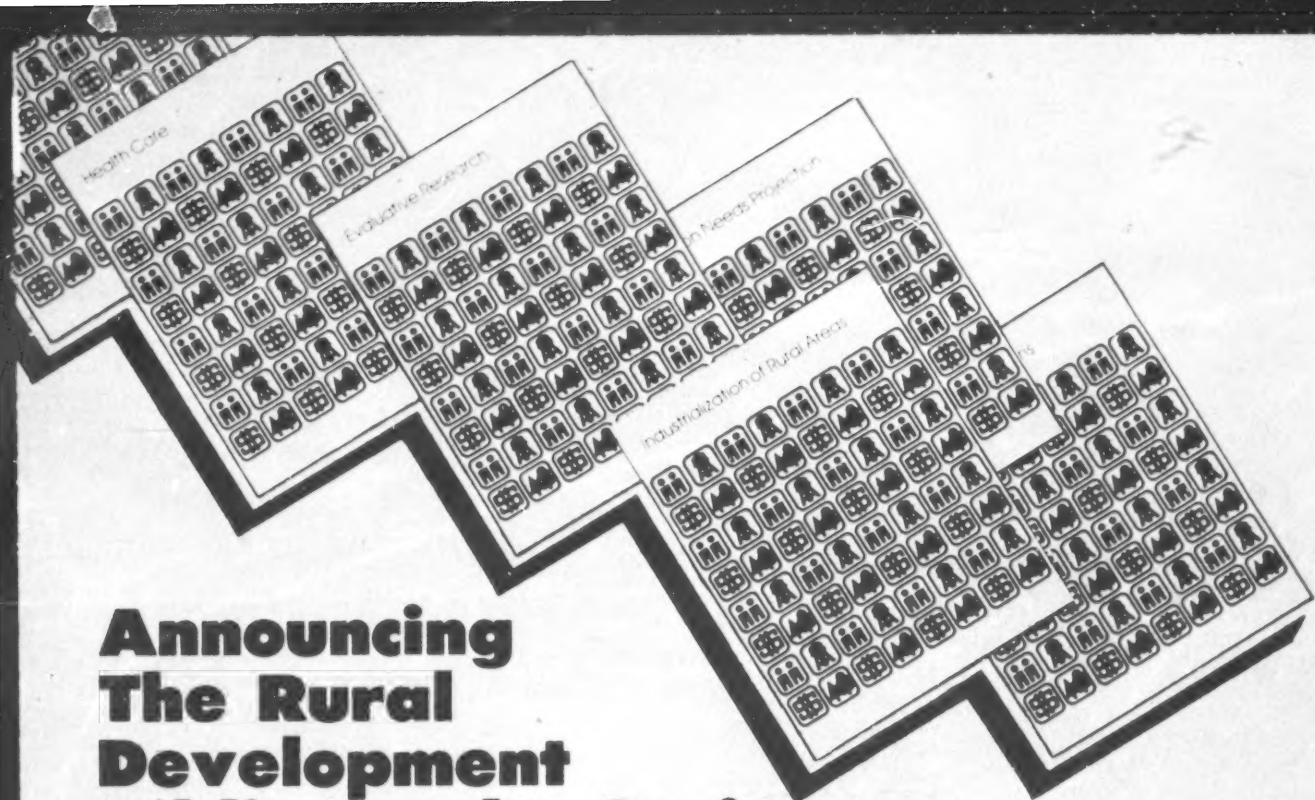
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